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ABSTRACT

The study examined the 2-year stability and validity of playroom observations of behaviors associated with hyperactivity in 48 boys who were evaluated originally as outpatients in a child psychiatry clinic, and seen again approximately 2 years later at follow-up. At both evaluations, the boys participated in two 15-minute playroom procedures: a relatively unstructured free play period; and a relatively structured, restricted academic period. The observation measures of gross and fine motor activity, sustained attention, and self-vocalization in both periods showed significant stability over the 2-year period, even after the effects of age and IQ were partialled out. Further, these behaviors generally showed significant improvement between the two observations. Thus, consistent with previous research and clinical observations, behaviors typically associated with hyperactivity were found to show significant improvement as the boys got older, although their relative rank order remained stable. The results also indicated that a measure of hyperactivity generated at referral was significantly related to many of the observation measures collected at follow-up. Taken together, these results suggest that the present playroom observation procedure is measuring stable and valid aspects of hyperactive behavior among a sample of clinic-referred boys. (Author/CL)

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Two year stability and validity of playroom observations of hyperactivity

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Abstract

The present study examined the two year stability and validity of playroom observations of behaviors associated with hyperactivity. The subjects for the study consisted of 48 boys who were evaluated originally as outpatients in a child psychiatry clinic, and seen again approximately two years later at follow-up. At both evaluations the boys participated in two 15-minute playroom procedures: a relatively unstructured Free Play period; and a relatively structured, Restricted Academic period. The observation measures of gross and fine motor activity, sustained attention, and self-vocalization in both periods showed significant stability over the two year period, even after the effects of age and IQ were partialled out. Further, these behaviors generally showed significant improvement between the two observations. Thus, consistent with previous research and clinical observations, behaviors typically associated with hyperactivity were found to show significant improvement as the boys got older, although their relative rank order remained stable. The results also indicated that a measure of hyperactivity generated at Referral was significantly related to many of the observation measures collected at Follow-up. Taken together, these results suggest that the present playroom observation procedure is measuring stable and valid aspects of hyperactive behavior among a sample of clinic-referred boys.

TABLE 2

DESCRIPTION OF PLAYROOM OBSERVATION PROCEDURES

3 X 5m Room - One-way Mirror - 4 Tables

Two 15-Minute Periods:

A) Free play - same five toys on all four tables. Child is free to play with any of the toys he so desires;

B) Restricted academic - worksheets with Coding-like items on three tables, appealing toys, different from those used during Free Play, on fourth. Child is told to remain seated, work on the worksheets, and not play with the toys.

Behaviors Observed:

1) Grid crossings - the number of times the child crossed one of the 16 grids taped on the floor;
2) Out-of-seat - the percent of time spent out of a chair;
3) Fidgeting - the percent of time spent in repetitive, nonpurposeful motor behavior;
4) Vocalization - the percent of time the child spent making any audible vocal noise;
5) On-task - the percent of time the child spent attending to a toy (during Free Play period) or a worksheet (during Restricted Academic period);
6) Attention shifts - the number of times the child shifted between on- and off-task, or between different forms of on-task;
7) Forbidden toys - the percent of time the child spent touching the forbidden toys during the Restricted Academic period.

Behaviors Recorded:

1) Wrist and Ankle actometer scores;
2) Number of Worksheet items completed during the Restricted Academic period.

Interrater Reliability:

The average intraclass correlation for the observed behaviors was greater than .95 for all behaviors except Attention Shifts, for which the correlation was .87.

All the playroom variables were transformed by a Log (N + 1) transformation for those variables employing a frequency count and an arcsin of the square root transformation for those variables expressed as a percentage of the time.

TABLE 3

A SUMMARY OF THE STABILITY COEFFICIENTS AND CORRELATED T-TESTS COMPARING THE REFERRAL AND FOLLOW-UP FREE PLAY VARIABLES

Variable	Stability Coefficient[a]	$\bar{x}$ at Referral[b]	$\bar{x}$ at Follow-up[b]	Correlated t-test[c]
Wrist actometer	.44**	2.92	2.97	-1.15
Ankle actometer	.44**	2.54	2.70	-1.89
Grid crossings	.48**	1.12	0.91	2.82**
On-task	.42**	1.23	1.27	-1.07
Attention shifts	.08	1.30	1.16	3.61**
Out-of-seat	.53**	0.66	0.47	2.66**
Fidgeting	.31*	0.13	0.11	0.78
Vocalization	.51**	0.32	0.19	2.84**

[a]All of the significant stability coefficients remained so after the effects of age and IQ were partialled out.

[b]The means reflect the transformed scores.

[c]A positive score represents a decrease in the behavior over time, a negative score an increase.

*$P < .05$

**$P < .01$

TABLE 4

A SUMMARY OF THE STABILITY COEFFICIENTS AND CORRELATED T-TESTS COMPARING THE REFERRAL AND FOLLOW-UP RESTRICTED ACADEMIC VARIABLES

Variable	Stability Coefficient[a]	$\bar{x}$ at Referral[b]	$\bar{x}$ at Follow-up[b]	Correlated t-test[c]
Wrist actometer	.46**	2.73	2.71	0.34
Ankle actometer	.24	2.45	2.57	-1.30
Grid crossings	.57**	0.62	0.51	1.88
On-task	.33*	0.92	1.12	-3.74**
Attention shifts	-.09	1.25	1.14	1.72
Out-of-seat	.44**	0.21	0.14	1.70
Fidgeting	.45**	0.39	0.31	2.30*
Vocalization	.29*	0.33	0.18	2.85**
Forbidden Toys	.08	0.11	0.11	-0.05
Worksheet items completed	.35*	2.00	2.29	-6.00**

[a]All of the significant stability coefficients, except for Worksheet items completed, remained so after the effects of age and IQ were partialled out.

[b]The means reflect the transformed scores.

[c]A positive score represents a decrease in the behavior over time, a negative score an increase.

*$P < .05$

**$P < .01$

TABLE 5

A SUMMARY OF THE STABILITY COEFFICIENTS AND CORRELATED T-TESTS COMPARING THE REFERRAL AND FOLLOW-UP RATING SCALE FACTORS

Variable	Stability Coefficient[a]	$\bar{x}$ at Referral[b]	$\bar{x}$ at Follow-up[b]	Correlated t-test[c]
Teacher Hyperactivity	.42**	1.67	1.33	2.51*
Teacher Aggression	.54**	1.20	1.06	1.15
Mother Hyperactivity	.34**	1.34	0.75	5.02**
Mother Aggression	.39**	1.46	1.08	3.22**

[a]The significant stability coefficients remained so after the effects of age and IQ were partialled out.

[b]The values reflect the mean score per item.

[c]A positive score represents a decrease in the rating over time.

*$P < .05$

**$P < .01$

TABLE 6

CORRELATIONS BETWEEN THE SYMPTOM FACTORS FROM REFERRAL AND THE FREE PLAY VARIABLES FROM FOLLOW-UP

Variable	Hyperactivity	Aggression
Wrist actometer	.24	-.03
Ankle actometer	.40**[a]	.07
Grid crossings	.48**[a]	.13
On-task	-.21	-.13
Attention shifts	.28*	.20
Out-of-seat	.32*	.22
Fidgeting	-.23	-.30*
Vocalization	.19	.04

[a]The Hyperactivity factor made a significant and unique contribution to predicting the observation variable, beyond the variance it shared with the Aggression factor.

*$P < .05$

**$P < .01$

TABLE 7

CORRELATIONS BETWEEN THE SYMPTOM FACTORS FROM REFERRAL AND THE RESTRICTED ACADEMIC VARIABLES FROM FOLLOW-UP

Variable	Hyperactivity	Aggression
Wrist actometer	.53**[a]	.31*
Ankle actometer	.51**[a]	.04
Grid crossings	.39**[a]	.16
On-task	-.52**[a]	-.22
Attention shifts	.32*	.27
Out-of-seat	.36**[a]	.10
Fidgeting	.25	-.01
Vocalization	.43**[a]	.12
Forbidden toy	.28*[a]	.03
Worksheet items completed	-.40**[a]	-.20

[a]The Hyperactivity factor made a significant and unique contribution to predicting the observation variable, beyond the variance it shared with the Aggression factor.

*P < .05

**P < .01

discriminant validity when rating scale and observation data were used as criteria. The Hyperactivity factor consisted of the symptoms of fidgetiness, impulsivity, attention problems, and hyperactivity. The Aggression factor consisted of negative affect and aggressive interpersonal behavior.

Results

1. Tables 3 and 4 present the results of the stability correlations and the correlated t-tests between Referral and Follow-up for the Free Play and Restricted Academic periods. As is evident, all but one of the Free Play variables and 3 of the Restricted Academic variables show significant stability. Further, except for Worksheet items completed, these correlations remain significant after the effects of age and IQ are partialled out.

2. Tables 3 and 4 also indicate that several of these measures exhibit significant improvement over time. Generally, measures of vocalization and gross motor activity in the Free Play period and sustained attention and vocalization in the Restricted Academic period are significantly improved at Follow-up. The results of the stability correlations and t-tests thus support the widely held belief that the major symptoms of hyperactivity improve with time, but that a child's rank order remains relatively constant.

3. Table 5 presents results of analyses looking at the mother and teacher ratings, perhaps the most widely employed diagnostic and outcome measures in the hyperactivity literature. All four factors show significant stability and, except for Teacher Aggression, significant improvement over time. It is interesting to note that the magnitude of the stability coefficients for many of the observation variables are comparable to those of the rating scale factors.

Introduction

1. The current research group has recently offered data (Milich, Loney, & Landau, 1982) indicating that a playroom observation procedure can significantly identify behaviors typically associated with hyperactivity. Specifically, an independently-derived Hyperactivity factor was found to significantly predict observed measures of gross and fine motor activity and sustained attention, among others.

2. The current study was designed to examine the two year stability and validity of these same playroom observation procedures. Such follow-up assessments should shed further light on the reliability and validity of these observations. Specifically, the results of this study should indicate whether the observation procedure is measuring stable aspects of the children's behavioral repertoire, rather than merely situational demands associated with the initial clinic evaluation.

3. The results of the current study also will offer data concerning the developmental course of hyperactivity. It is now widely accepted that the major symptoms of hyperactivity decrease with age, although the behavior of the older hyperactive child is still distinguishable from that of his peers (Milich & Loney, 1979). However, an examination of the research literature suggests that few, if any, observation studies exist documenting these changes. Instead, these conclusions rest primarily upon studies employing rating scales, laboratory measures, or psychological tests. The results of the current study should help rectify this problem.

Methods

Subjects:

Subjects for the present study consisted of 48 boys who were consecutive referrals to an outpatient child psychiatry clinic for diagnostic evaluation and seen again at Follow-up approximately two years later (see Table 1). The initial Referral sample thus included boys with a variety of behavior problems and psychiatric disorders. Of the 100 boys originally seen at Referral, 77 were successfully followed-up. Thirteen of the 77 boys could only be seen at home so that no observation data could be collected. Another 16 boys were 13 years of age or older at Follow-up and were felt to be too old for the toys employed in the Free Play observation period. Thus, complete data were available for 48 of the boys.

Procedures:

During the afternoons of both the Referral and Follow-up evaluations the boys participated in two consecutive 15-minute playroom observation procedures (see Table 2).

Rating scale factors: Mother and teacher versions of the Conners rating scales were available for each boy in the study at both Referral and Follow-up. Empirically-derived Hyperactivity and Aggression factors were computed for each boy at both Referral and Follow-up for both the mother (Guy, 1976) and teacher (Loney & Milich, 1982) versions. Measures of internal consistency (Cronbach's alpha) indicated acceptable cohesiveness for each factor ($\bar{x}$=.85, range from .82 to .89).

Chart rating factors: Empirically-derived Hyperactivity and Aggression factors were generated from ratings of the boys' psychiatric charts at Referral. Previous research (Milich et al., 1982) had demonstrated that the Hyperactivity factor reflects both convergent and

during the Restricted Academic period. However, the fact that these same behaviors showed significant stability suggests that a child's relative standing in the group has remained constant - those boys who are most symptomatic regarding these behaviors at Referral tend to be the ones having the most difficulty at Follow-up. This interpretation is reinforced by the finding that the Hyperactivity factor generated at Referral is significantly correlated with many of the Follow-up observation variables.

4. In summary, the results of the current study indicate that a relatively brief sample of behavior observed in a clinic playroom can be used to give stable and valid information concerning the primary symptoms associated with hyperactivity. These include measures of gross and fine motor behavior, as well as of sustained attention. Further, the stability coefficients obtained are comparable to those obtained for mother and teacher ratings of hyperactivity, ratings that are based upon numerous observations of large samples of behavior spread over time. Finally, the current results appear to offer the first direct observational evidence for the widely held belief that although the major symptoms of hyperactivity may decrease with advancing age, a child's relative deviance remains stable.

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TABLE 1

DESCRIPTION OF SAMPLE (N=48)

Selection Criteria at Referral:

All male outpatient referrals to child psychiatry unit who:

A) were between 6-0 and 12-11 years old;

B) were in grades one through six;

C) had a WISC-R Full Scale IQ > 70;

D) had no peripheral sensory loss, psychosis, epilepsy, cerebral palsy, or unequivocal brain damage;

E) were not on CNS stimulant medication on the day of the evaluation;

F) gave informed consent to participate in the study.

Selection Criteria at Follow-up:

Less than 13.0 years of age on date of follow-up evaluation.

Sample Description	$\bar{x}$ at Referral	(S.D.)	$\bar{x}$ at Follow-up	(S.D.)
WISC-R Full Scale IQ	100.1	(11.4)	N.A.	
Hollingshead & Redlich SES	3.5	(1.1)	3.3	(1.2)
Age in Years	8.8	(14.0)	10.9	(13.3)
WRAT Reading Standard Score	97.8	(13.6)	97.6	(11.0)
WRAT Spelling Standard Score	93.1	(12.9)	90.7	(13.8)
WRAT Arithmetic Standard Score	92.5	(11.2)	86.2	(10.7)
Time in Months Since Initial Evaluation	26.5	(4.2)		

4. Tables 6 and 7 present the correlations between the two symptom factors from Referral and the observation variables from Follow-up. Consistent with the earlier study looking at the observation variables from Referral (Milich et al., 1982), the Hyperactivity factor is significantly correlated with most of the Restricted Academic variables and many of the Free Play ones. In contrast, the Aggression factor shows few significant correlations. Further, the Hyperactivity factor makes a unique contribution to predicting many of the observation variables, beyond the variance shared with the Aggression factor. These results support the continued validity of the observation procedures, even over a period of two years.

Discussion

1. The current study found that the behaviors observed in the playroom procedure show significant stability, even after the effects of age and IQ are partialled out. Further, the magnitudes of the coefficients are comparable to those obtained for both mother and teacher rating scales, the most widely employed assessment procedures in the hyperactivity literature. These results strongly suggest that the relatively brief playroom procedure is measuring stable aspects of the boys' behavioral repertoire.

2. The stability of these findings cannot be attributed to the proposed covariation between hyperactive and aggressive behavior (Lahey, Green, & Forehand, 1980). There is a large body of literature documenting the stability and robustness of measures of aggressive behavior, even for periods lasting up to 15 years (cf., Olweus, 1979). However, in the current study the Aggression factor showed few significant relationships with the observation variables, and it did not make a unique contribution to any of these variables, beyond the variance shared with the Hyperactivity factor.

3. The results of the current study appear to offer some of the first observational data documenting the developmental course of hyperactivity. Specifically, there was a significant decrease over time in gross motor activity and vocalization during the Free Play period, and an increase in the time spent on-task